Attorney Docket No. 032350.B433
TI--25262

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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B.O.
6-14-02

In re application of
Murtaza Ali

Serial No. 09/261,913

Filed: December 16, 1999

For: Acoustic Echo Cancellation System

Art Unit: 2644
Examiner: Ping Lee

Commissioner for Patents
Washington, D. C. 20231

Sir:

AMENDMENT UNDER 37 C.F.R. 1.111

In response to the Office action dated March 28, 2002, please amend the above identified application as follows:

In the specification:

Pages 11 and 12, beginning on line 12 of page 11; last partial paragraph change to :

" $\alpha_{i.max}$ and $\alpha_{i.min}$ in equation (4), represent the maximum and minimum allowable values of α_i (n) or the bounded random variable. In order to ensure stability, we must have $\alpha_{i.max} < 1$ and $\alpha_{i.min} > -1$. Further restrictions are also required to maintain transparency in speech perception. These restrictions are derived from the data known as "just noticeable inter-aural delay" in psychoacoustics. A discussion of this is found in E. Zwicker and H. Fastl, *Psychoacoustics: Facts and Models*, Heidelberg, Germany: Springer-Verlag, 1990. This data represents the minimum change in the inter-aural time delay between the two ears at a given frequency that causes a noticeable change in the perception of the direction of sound. The all-pass filter changes the phase of each frequency of the input speech. The effect of this phase change is to change the time arrival of the signal at each frequency in the ears. So, if we limit the phase changes so that the change in the time of arrival for each channel is within the just noticeable inter-aural delay, then spatial perception of stero signal will not be affected. The just noticeable inter-aural delay varies between 30 μsec. to 200 μsec. We have chosen to limit the change in the time of arrival of each frequency within 60 μsec. This leads to the following values of $\alpha_{i.max}$ and $\alpha_{i.min}$,

$$\alpha_{i.max} = 0 \text{ and}$$
$$\alpha_{i.min} = -0.9. \text{"}$$